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HOW YOUR SHELLED CORN IS BOUGHT



Ontario

R.G. Bennett
Deputy Minister

Ministry of
Agriculture
and Food

Hon. William G. Newman
Minister

Government
Publications

HOW YOUR SHELLED CORN IS BOUGHT

R.F. Heard, Farm Management Specialist
and
R.E. Clayton, Agricultural Engineering Specialist

The purpose of this publication is to explain the calculations used in arriving at the value of wet shelled corn. In order to determine the value of corn you start with the quoted price and then take into account such factors as moisture content, drying and handling costs in addition to quality factors that affect the grade. Let's begin by looking at the unit of corn called a bushel.

A STANDARD BUSHEL

For evaluating the calculations, we must first understand the basic unit of measurement for shelled corn. The grain corn is bought and sold on a "standard bushel" basis. The bushel used in Ontario is comprised of 56 pounds of shelled corn at a moisture content of 15.5%. If you had a type of "x-ray" vision you could look at a bushel of corn and see the water in it. You would also see all the other ingredients. If the water was entirely removed; these other ingredients could be called "dry matter". Obviously with 15.5% of the standard bushel being water, the remainder or 84.5% of the bushel is dry matter, and 84.5% of 56 is 47.32 pounds of dry matter.

Thus when we sell a bushel of corn we must provide the buyer with 47.32 pounds of dry matter, as it is the dry matter that is of real value.

Shelled Corn	15.5% Water	8.68 lb Water
56 lb at	84.5%	47.32 lb
15.5%	Dry Matter	Dry Matter
Moisture		
Standard Bushel	Percentage of Components	Actual Weight of Components

Figure 1. Three drawings depicting a standard bushel of shelled corn.

AMOUNT OF WET CORN IN A BUSHEL

When we are selling corn, it usually is above 15.5% moisture content, which means that the corn is lower in dry matter than the 84.5% level in a standard bushel. Thus, it will take more total pounds of the wetter grain to provide the 47.32 pounds of dry matter required for a standard bushel. For example, consider a corn with a 30% moisture test. It would be 70% dry matter. The question then is: How many pounds of corn at 70% dry matter does it take to provide 47.32 pounds dry

matter? Since 70% of the total weight is 47.32 pounds, then 1% of the total weight would be 70 divided into 47.32 or $(47.32) = 0.6760$ pounds. From this it follows that 100% (or the total weight) would be 100 times $0.6760 = 67.60$ pounds.

Therefore, the weight of corn at 30% moisture content needed to produce a standard bushel of corn is 67.60 pounds. It is of interest to note that the amount of water present in the 67.60 pounds of corn is 20.28 pounds (67.60 pounds total weight less 47.32 pounds dry matter). In other words, the 67.60 pounds of wet corn contain a total of slightly over 2 gallons of water.

SHORT FORM CALCULATION

If you wish to avoid the steps shown in solving this problem, simply divide the dry matter percentage of your wet corn into 4732 (the amount of dry matter in a standard bushel times 100) to obtain the wet weight needed to provide a standard bushel, e.g.

$$\frac{4732}{70} = 67.60 \text{ pounds.}$$

Thus wet corn weight required for a standard bushel

$$= \frac{4732}{(100 - \text{corn moisture content})}$$

If we go back to looking at the two samples of corn with x-ray vision, we see that as illustrated in Figure 2, each has the same amount of dry matter but different weights of water.

8.68 lb water	20.28 lb water
47.32	47.32
lb dry matter	lb dry matter
Standard Bushel 56 lb	67.60 lb corn at 30% moisture to provide a Standard Bushel

Figure 2. Two drawings comparing the components of a standard bushel of shelled corn with those of wet corn.

LOSSES FROM HANDLING AND STORAGE

When corn is handled and stored, there is a small loss in weight. Some of this loss occurs as the dust that escapes when elevating and handling the corn and some of the loss may even result from a slight conversion of dry matter into volatile gases. This loss amounts to about $\frac{1}{2}$ of 1% of the weight of the corn, or about 10 pounds per ton. Since it is impossible to see exactly where this loss occurs, it is sometimes called “invisible” loss. But since there is such a loss, some adjustment in weight is necessary to compensate for it, which is done by a three-step process:

1. calculating the weight of corn that is needed to yield a standard bushel,
2. calculating $\frac{1}{2}$ of 1% of that figure, and
3. adding the results of (1) and (2) together.

We saw in the example of corn with moisture content of 30% that 67.60 pounds were needed to yield the 47.32 pounds of dry matter required for a standard bushel. To compensate for the natural losses, add on $\frac{1}{2}$ of 1% of 67.60 pounds.

One percent of 67.60 pounds is $\frac{67.60}{100} = .6760$ pounds

One half of this is $\frac{.6760}{2} = .338$ pounds

Thus we add .338 pounds to 67.60 and get 67.938 pounds. Therefore, we must divide the weight of a load of 30% moisture corn by 67.938 pounds to obtain the number of standard bushels.

A wet corn conversion table (Table 1) has been prepared to help in calculating shelled corn values. This table gives the pounds of wet shelled corn which are required, at given moisture levels, to provide a standard bushel. The figures include the allowance of $\frac{1}{2}$ of 1% for handling and storage losses. The table also lists a set of multiplier numbers to use in converting the weight of wet shelled corn to its equivalent weight at the standard 15.5% moisture level.

To find the number of standard bushels, multiply the wet weight by the appropriate multiplier and divide the answer by 56.

MOISTURE TESTING

Test Methods

A moisture test can be made with a number of different “testers” which give varying degrees of accuracy depending upon the quality of the instrument. The Canadian Grain Commission (CGC) through much research found that the Model 919 Moisture Meter (measures electrical conductivity through a grain mass) gave reasonable results for wheat when compared with established “oven drying” standards. Further checking of this instrument with corn samples has given rise to the use of the same tester for corn in Canada. Accordingly, the CGC utilizes the Model 919 to establish a grade for the corn on an “inspection

certificate” as required by dealers marketing corn. The CGC checks their laboratory moisture meters twice a month with standard grain samples. Most country elevators utilize similar equipment and can obtain a moisture meter check by comparing readout results from the CGC laboratory meter and their own simultaneously in the local CGC laboratory. Similarly, farmers could check their own moisture meters.

Accuracy

All moisture meters are subject to some error. Instruments of good quality give accurate results within the moisture content range of the official CGC charts. Lesser quality instruments in advertising literature claim errors ranging from $\pm 0.1\%$ to $\pm 5\%$. Temperature of corn at other than room temperature and moisture content above 25% or below 13% may produce results with electrical resistance type meters which must be interpreted with care and experience in the field. Many manufacturers provide “Interpretive charts” and a printed procedure to help achieve the accuracy of the moisture tester. The only moisture test that is accurate involves weighing the wet corn and then drying the product in an air oven under controlled conditions for a prescribed period of time.

Checking Moisture Contents

Where moisture content disputes arise between buyer and seller, the CGC will complete a moisture test as an independent third party. Samples for moisture testing must be submitted according to the CGC requirements.

Wet shelled corn has the ability to increase apparent moisture content rapidly. Therefore, the samples to be submitted to the local CGC laboratory should be forwarded as quickly as possible to lessen the chance of error in determining moisture. (Wet shelled corn undergoes biochemical change producing hygroscopic moisture on the kernel surface which is interpreted by the electrical resistance type moisture tester as an increase in moisture content.)

The CGC uses an “air oven” method (72 hours at 103°C) for standardizing the Model 919 moisture testers used in their provincial laboratories for corn.

A method for estimating moisture content

On the farm an approximate moisture test can be accomplished using food scales to weigh out a sample, a cookie pan to permit single layer spreading of the corn sample and the kitchen oven set at 100°C (212°F) for a period of 12 hours (overnight). The following method is suggested:

- (a) Using the food scales weigh out 150 to 250 grams ($\frac{1}{3}$ to $\frac{1}{2}$ pound) of the wet corn. Record the actual wet weight of the corn. (Do not include the weight of the container in any of the recorded weights.)
- (b) Spread the wet corn uniformly on the cookie pan.

- (c) Place the cookie pan with the wet corn in the kitchen oven.
- (d) Set the kitchen oven for temperature of 212°F and leave for 12 or more hours.
- (e) After 12 hours remove the dried product and reweigh using the same container as for the wet corn — record the dry weight.

- (f) Calculate the moisture content of the wet corn as follows:

$$\frac{(\text{wet weight} - \text{dry weight})}{\text{wet weight}} \times 100\% = \text{moisture content}$$

For example, if the wet weight was 16 oz and the dry weight was 9 oz, then the approximate moisture content of the wet corn was

$$\frac{(16 - 9)}{16} \times 100\% = 44\%$$

One must bear in mind that there may be inaccuracies in the food scales, and that the time allowance in the oven may be short. However, the result may be as reliable for moisture contents exceeding 35 to 40% as many of the "Moisture Testers" on the market.

DRYING COSTS

In order to prevent shelled corn from spoiling when in short term storage, it must be dried to at least 15.5% moisture level. Many corn handlers may dry it more than this to avoid storage problems, particularly if the corn is going into storage for several months. Whether the corn grower dries his corn, or has it dried at the elevator, it is going to cost him money to have the excess (above 15.5%) moisture removed. In the case of 30% moisture corn, 11.6 pounds or more than a gallon of water must be removed. The Ontario Grain and Feed Dealers Association establishes annually a standard schedule of drying charges.

DOCKAGE

The shelled corn is passed over a "corn" screen before weighing at most corn receiving Ontario country elevators. This removes more or less the "fines" that pose problems when drying with some dryers. But the process of screening the corn frequently slows down the rate at which the elevator can unload and elevate the corn into temporary storage. And in some situations it is not practical to screen the corn until after it is dried.

To solve these two problems, a sample of the corn may be examined visually (Figure 3), weighed and then screened using a 12/64 round holed screen (Figure 4). The percent fines or screening is thus determined and the weight of the corn "docked" accordingly. For example, if screening produced 6% by weight of the sample then 6% of the gross weight would be subtracted as dockage.

It appears that there is a good deal of difference between elevators on how severely dockage is applied in determining the value of a load of corn. This is

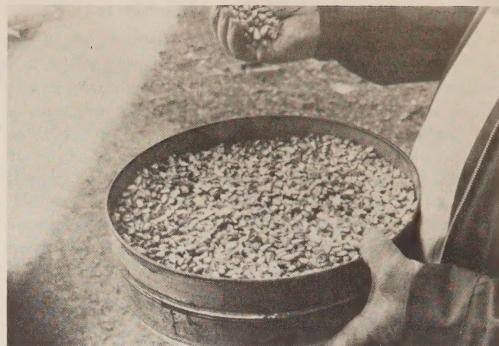


Figure 3. The visual examination and screening of a corn sample.

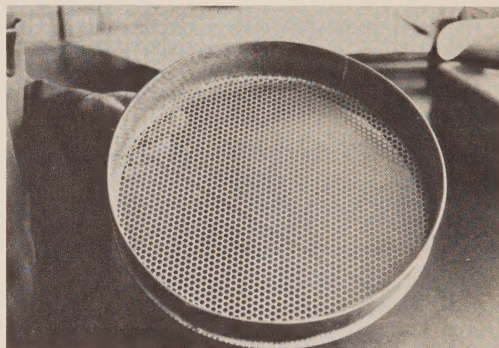


Figure 4. This kind of pan may be used to hand screen a sample of corn for estimating the percent of screenings.

understandable as in some cases the operator has no use for the screenings and cannot dry them. In other cases the operator will be using the grain for live-stock feed and his dryer will handle corn with some screenings so he really does not have to apply any dockage.

In Illinois, dockage is taken as a price adjustment and in 1974 varied from 0 to 60 cents a bushel for corn with 10% fines. In any case it seems reasonable that the amount of dockage should relate to the difference in price between clean corn, and corn screenings, taking into account the cost of handling, screening and drying.

CORN QUALITY AND ITS EFFECT ON PRICE

Normally the quoted price or posted "board" price is for No. 2 corn or better. On years when corn quality is all quite good, this is the price that most growers receive. In bad crop years, adjustments or discounts for poor quality corn are made.

But what is quality? In corn, such things as freedom from odor, e.g. a musty smell, is important, as freedom from mould, dirt, foreign material, and cracked kernels. Uniformity of kernel size is important for some users, and brightness of color is a general indicator of quality.

But most users of corn put particular emphasis on density, expressed as "test weight per bushel". For corn weighing 50, 51, 52 or 53 pounds per bushel there is a 5¢ discount, and another 5¢ discount if the weight is 47, 48 or 49 pounds, and an even more severe discount if the weight is 46 pounds or less.

The Canada Grain Act describes the method for determining the test weight. An imperial pint brass measure is used, which is filled by pouring corn from the scale scoop held 2 inches above the measure. Pouring is done in such a way that the measure is filled to overflowing in about 2 or 3 seconds (Figure 5).

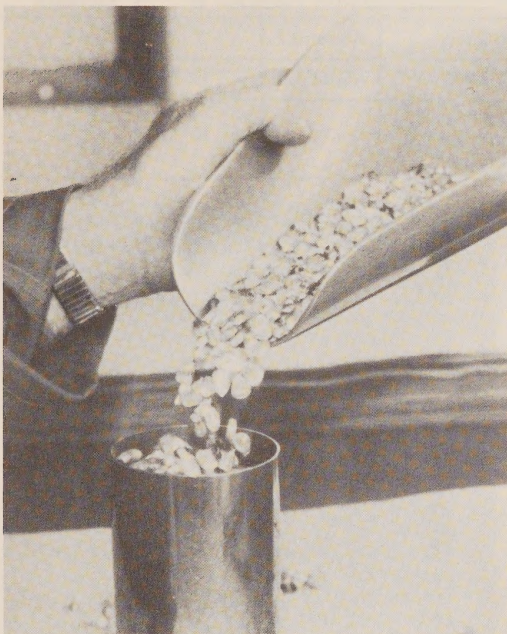


Figure 5. For test weight determination the pint brass measure is filled to overflowing by pouring corn from the scale scoop held 2 inches above the measure.

The corn is then levelled off (using a 7/8 inch round hardwood striker) by using a zig-zag motion of three equal movements at an angle of about 45° (Figure 6). The test weight is determined by weighing the pint measure of grain on a scale calibrated to indicate the test weight per bushel (Figure 7).

For practical reasons the test weight is determined as the corn is being delivered and thus is still "wet". In a normal season when corn quality is good and is between 18 and 30% moisture, you would expect an increase in weight per bushel when it has been dried. But in years when the corn hasn't matured properly and is quite wet (over 30%) at harvest it will weigh less when dried. Typically this will be a 2 to 6 pounds per bushel decrease in test weight. An official test weight would be provided by the Canadian Grain Commission only on dry corn.



Figure 6. The measure is levelled using a specified striker and motion.



Figure 7. The test weight per bushel is read directly from a scale specially calibrated for the purpose.

GRADES OF CORN (Canada Eastern)

The Canada Grain Act, 1973 sets out the specifications for statutory grades of Canadian grain. In practice these standards are seldom fully applied to corn as it is sold by the Ontario grower to his local elevator. The standards are shown in the following table but, it should be pointed out that there are "Sample" grades for corn not meeting the specifications as shown. For example, if the test weight per bushel was less than 47 pounds, the corn would be designated as "Sample" Canada Eastern Yellow Account Light Weight, assuming it is "yellow" corn. Sample grades could also be provided for corn with excess cracked corn and foreign material, excess rotted kernels, sour, heated, etc.

GRADES OF CORN (CANADA EASTERN)

The class name, whether Yellow, White or Mixed Corn shall be added to and become part of the grade name.

Standard of Quality				Maximum Limits of		
Grade name No.	Minimum weight per measured bushel in pounds	Minimum percentage of variety or type other than for mixed corn	Degree of soundness	Damaged corn		Cracked kernels and other foreign material %
				Heat damaged %	Total damaged %	
No. 1 Canada Eastern	56	95	Cool and sweet and uniform in size	About 0.1	3	About 2
No. 2 Canada Eastern	54	95	Cool and sweet	About 0.2	5	3
No. 3 Canada Eastern	52	95	Cool and sweet	About 0.5	7	5
No. 4 Canada Eastern	50	95	Cool and sweet	About 1.0	10	7
No. 5 Canada Eastern	47	95	Cool, may have a slight odor, but not sour or musty	3.0	15	12

THE METRIC SYSTEM

Canada has made the decision to adopt the metric system of measurement. Sooner or later this will involve the purchase and sale of grain corn. In fact some metric scales were installed by corn buyers in 1974.

However, the "bushel" isn't likely to disappear overnight, especially since the United States isn't making the conversion at the same time as Canada. As long as corn in Ontario has a price relationship to the Chicago futures market price, we will likely be involved in converting dollars per bushel to dollars per metric tonne (1000 kg). Table 2 gives you a quick and easy system of making such conversions. If you are buying (or selling) over a metric scale find the value of the corn by multiplying the weight in tonnes by the price per tonne that is equivalent to the agreed on price per bushel (Table 2).

Multiply the weight of your wet corn by the appropriate multiplier in Table 1 to get the equivalent weight of corn at the standard 15.5% moisture level, including the $\frac{1}{2}$ of 1% allowance for invisible loss. For example, if you are buying 30% wet corn at \$2 per bushel and you weigh the load in at 4.278 tonnes. What is its value? Follow these steps:

1. Convert to the 15.5% equivalent weight using Table 1. Multiply the weight of 4.278 tonnes by .82428 which results in 3.5262 tonnes.
2. Multiply price per tonne (from Table 2) x weight. Price of \$2 per bushel = \$78.74 per tonne. Therefore value = \$78.74 x 3.5262 = \$277.65.

But, if there are charges of 20¢ per bushel for drying this corn you reduce the paying price down to \$1.80 from the listed \$2 per bushel. The equivalent price from the table is \$70.86 per tonne, so, multiply the weight by \$70.86 (3.5262 x \$70.86) resulting in \$249.87 net.

WORKSHEET TO USE IN FINDING THE NET VALUE OF A LOAD OF SHELLED CORN

Fill in the information and do the calculations

- (a) Weight of shelled corn in the load (pounds or tonnes)
- (b) Percent dockage, if any
- (c) Reduction in weight: multiply (b) times (a)
- (d) Net weight of load: subtract (c) from (a)
- (e) Moisture percentage of the corn
- (f) Pounds of wet corn needed to yield a standard bushel (Table 1) (or use multiplier to obtain equivalent dry weight)
- (g) Number of bushels: Divide (f) into (d) (When multiplier is used in (f) divide the dry weight by 56)
- (h) Grade of the corn
- (i) Price for shelled corn of that grade
- (j) Drying charge per bushel
- (k) Other charges, e.g. trucking, storage, elevation
- (l) Total charges per bushel: add (j) and (k)
- (m) Net price per bushel: subtract (l) from (i) (If in metric use price per tonne (Table 2))
- (n) Net value of load: multiply (g) times (m)

HOW TO USE THE METRIC SYSTEM

This worksheet can be used on the metric system too. Just fill in (d) as the net weight in tonnes. Then convert this figure to the standard 15.5% moisture

basis by using the multiplier in Table 1 for the moisture content of the load, and multiply the number of tonnes so determined by the price per tonne shown in (m).

Table 1. Wet Corn Conversion Table

This table gives the pounds of wet shelled corn at varying moisture contents that are required to provide a standard bushel (56 pounds at 15.5% moisture). The figures include an allowance of 1/2 to 1% for handling

and storage losses. The multiplier is used to find the equivalent weight of a load of corn when converted to the 15.5% standard.

Moisture %	lb wet corn for one bushel	Multiplier to convert to 15.5% standard	Moisture %	lb wet corn for one bushel	Multiplier to convert to 15.5% standard
15.6	56.347	.99384	19.6	59.150	.94675
15.7	56.414	.99266	19.7	59.224	.94556
15.8	56.481	.99148	19.8	59.298	.94438
15.9	56.548	.99031	19.9	59.372	.94321
16.0	56.615	.98914	20.0	59.446	.94203
16.1	56.682	.98797	20.1	59.520	.94086
16.2	56.750	.98678	20.2	59.595	.93968
16.3	56.818	.98560	20.3	59.670	.93850
16.4	56.886	.98442	20.4	59.744	.93733
16.5	56.954	.98325	20.5	59.820	.93614
16.6	57.022	.98208	20.6	59.895	.93497
16.7	57.091	.98089	20.7	59.970	.93380
16.8	57.159	.97972	20.8	60.046	.93262
16.9	57.228	.97854	20.9	60.122	.93144
17.0	57.297	.97736	21.0	60.198	.93026
17.1	57.366	.97619	21.1	60.275	.92908
17.2	57.436	.97500	21.2	60.351	.92791
17.3	57.505	.97383	21.3	60.428	.92672
17.4	57.575	.97264	21.4	60.505	.92554
17.5	57.644	.97148	21.5	60.582	.92437
17.6	57.714	.97030	21.6	60.659	.92319
17.7	57.784	.96913	21.7	60.736	.92202
17.8	57.855	.96794	21.8	60.814	.92084
17.9	57.925	.96677	21.9	60.892	.91966
18.0	57.996	.96558	22.0	60.970	.91848
18.1	58.067	.96440	22.1	61.048	.91731
18.2	58.138	.96323	22.2	61.127	.91613
18.3	58.209	.96205	22.3	61.205	.91496
18.4	58.280	.96088	22.4	61.284	.91378
18.5	58.352	.95969	22.5	61.363	.91260
18.6	58.423	.95853	22.6	61.443	.91141
18.7	58.495	.95735	22.7	61.522	.91024
18.8	58.567	.95617	22.8	61.602	.90906
18.9	58.639	.95500	22.9	61.682	.90788
19.0	58.712	.95381	23.0	61.762	.90671
19.1	58.784	.95264	23.1	61.842	.90553
19.2	58.857	.95146	23.2	61.923	.90435
19.3	58.930	.95028	23.3	62.003	.90318
19.4	59.003	.94910	23.4	62.084	.90200
19.5	59.077	.94792	23.5	62.165	.90083

Moisture %	lb wet corn for one bushel	Multiplier to convert to 15.5% standard	Moisture %	lb wet corn for one bushel	Multiplier to convert to 15.5% standard
23.6	62.247	.89964	28.6	66.606	.84077
23.7	62.328	.89847	28.7	66.699	.83959
23.8	62.410	.89729	28.8	66.793	.83841
23.9	62.492	.89611	28.9	66.887	.83723
24.0	62.574	.89494	29.0	66.981	.83606
24.1	62.657	.89375	29.1	67.076	.83487
24.2	62.740	.89257	29.2	67.170	.83371
24.3	62.822	.89141	29.3	67.265	.83253
24.4	62.906	.89022	29.4	67.361	.83134
24.5	62.989	.88904	29.5	67.456	.83017
24.6	63.072	.88787	29.6	67.552	.82899
24.7	63.156	.88669	29.7	67.648	.82781
24.8	63.240	.88552	29.8	67.744	.82664
24.9	63.324	.88434	29.9	67.841	.82546
25.0	63.409	.88316	30.0	67.938	.82428
25.1	63.493	.88199	30.1	68.035	.82311
25.2	63.578	.88081	30.2	68.133	.82192
25.3	63.663	.87963	30.3	68.230	.82075
25.4	63.749	.87845	30.4	68.328	.81958
25.5	63.834	.87728	30.5	68.427	.81839
25.6	63.920	.87610	30.6	68.525	.81722
25.7	64.006	.87492	30.7	68.624	.81604
25.8	64.092	.87374	30.8	68.723	.81487
25.9	64.179	.87256	30.9	68.823	.81368
26.0	64.266	.87138	31.0	68.923	.81250
26.1	64.353	.87020	31.1	69.023	.81132
26.2	64.440	.86903	31.2	69.123	.81015
26.3	64.527	.86785	31.3	69.224	.80897
26.4	64.615	.86667	31.4	69.324	.80780
26.5	64.703	.86549	31.5	69.426	.80661
26.6	64.791	.86432	31.6	69.527	.80544
26.7	64.879	.86315	31.7	69.629	.80426
26.8	64.968	.86196	31.8	69.731	.80309
26.9	65.057	.86078	31.9	69.833	.80191
27.0	65.146	.85961	32.0	69.936	.80073
27.1	65.235	.85843	32.1	70.039	.79955
27.2	65.325	.85725	32.2	70.142	.79838
27.3	65.415	.85607	32.3	70.246	.79720
27.4	65.505	.85490	32.4	70.350	.79602
27.5	65.595	.85372	32.5	70.454	.79484
27.6	65.686	.85254	32.6	70.559	.79366
27.7	65.777	.85136	32.7	70.664	.79248
27.8	65.868	.85019	32.8	70.769	.79131
27.9	65.959	.84901	32.9	70.874	.79013
28.0	66.051	.84783	33.0	70.980	.78895
28.1	66.143	.84665	33.1	71.086	.78778
28.2	66.235	.84547	33.2	71.193	.78659
28.3	66.327	.84430	33.3	71.299	.78542
28.4	66.420	.84312	33.4	71.406	.78425
28.5	66.513	.84194	33.5	71.514	.78306

Moisture %	lb wet corn for one bushel	Multiplier to convert to 15.5% standard	Moisture %	lb wet corn for one bushel	Multiplier to convert to 15.5% standard
33.6	71.621	.78189	36.6	75.010	.74657
33.7	71.729	.78071	36.7	75.129	.74538
33.8	71.838	.77953	36.8	75.248	.74421
33.9	71.946	.77836	36.9	75.367	.74303
34.0	72.055	.77718	37.0	75.487	.74185
34.1	72.165	.77600	37.1	75.607	.74067
34.2	72.274	.77483	37.2	75.727	.73950
34.3	72.384	.77365	37.3	75.848	.73832
34.4	72.495	.77247	37.4	75.969	.73714
34.5	72.605	.77130	37.5	76.091	.73596
34.6	72.717	.77011	37.6	76.212	.73479
34.7	72.828	.76894	37.7	76.335	.73361
34.8	72.940	.76775	37.8	76.458	.73243
34.9	73.052	.76658	37.9	76.581	.73125
35.0	73.164	.76540	38.0	76.704	.73008
35.1	73.277	.76422	38.1	76.828	.72890
35.2	73.390	.76305	38.2	76.952	.72773
35.3	73.503	.76187	38.3	77.077	.72655
35.4	73.617	.76069	38.4	77.202	.72537
35.5	73.731	.75952	38.5	77.328	.72419
35.6	73.846	.75833	38.6	77.454	.72301
35.7	73.960	.75717	38.7	77.580	.72184
35.8	74.076	.75598	38.8	77.707	.72066
35.9	74.191	.75481	38.9	77.834	.71948
36.0	74.307	.75363	39.0	77.962	.71830
36.1	74.423	.75246	39.1	78.090	.71712
36.2	74.540	.75127	39.2	78.218	.71595
36.3	74.657	.75010	39.3	78.347	.71477
36.4	74.775	.74891	39.4	78.476	.71359
36.5	74.892	.74774	39.5	78.606	.71241

Table 2. Price equivalent table

Where a bushel equals 56 pounds of corn at 15.5% moisture, where a ton equals 2,000 pounds of corn at 15.5% moisture, where a tonne equals 1,000 kilo-

grams of corn at 15.5% moisture (metric ton) and where a kilogram equals 2.204623 pounds and one pound equals 0.453592 kilograms.

PRICE PER:			PRICE PER:		
Bushel	Ton	Tonne	Bushel	Ton	Tonne
\$1.30	\$46.43	\$51.18	\$1.80	\$64.29	\$70.86
1.31	46.79	51.57	1.81	64.64	71.26
1.32	47.14	51.97	1.82	65.00	71.65
1.33	47.50	52.36	1.83	65.36	72.04
1.34	47.86	52.75	1.84	65.71	72.44
1.35	48.21	53.15	1.85	66.07	72.83
1.36	48.57	53.54	1.86	66.43	73.22
1.37	48.93	53.93	1.87	66.79	73.62
1.38	49.29	54.33	1.88	67.14	74.01
1.39	49.64	54.72	1.89	67.50	74.41
\$1.40	\$50.00	\$55.12	\$1.90	\$67.86	\$74.80
1.41	50.36	55.51	1.91	68.21	75.19
1.42	50.71	55.90	1.92	68.57	75.59
1.43	51.07	56.30	1.93	68.93	75.98
1.44	51.43	56.69	1.94	69.29	76.37
1.45	51.79	57.08	1.95	69.64	76.77
1.46	52.14	57.48	1.96	70.00	77.16
1.47	52.50	57.87	1.97	70.36	77.56
1.48	52.86	58.27	1.98	70.71	77.95
1.49	53.21	58.66	1.99	71.07	78.34
\$1.50	\$53.57	\$59.05	\$2.00	\$71.43	\$78.74
1.51	53.93	59.45	2.01	71.79	79.13
1.52	54.29	59.84	2.02	72.14	79.52
1.53	54.64	60.23	2.03	72.50	79.92
1.54	55.00	60.63	2.04	72.86	80.31
1.55	55.36	61.02	2.05	73.21	80.70
1.56	55.71	61.41	2.06	73.57	81.10
1.57	56.07	61.81	2.07	73.93	81.49
1.58	56.43	62.20	2.08	74.29	81.89
1.59	56.79	62.60	2.09	74.64	82.28
\$1.60	\$57.14	\$62.99	\$2.10	\$75.00	\$82.67
1.61	57.50	63.38	2.11	75.36	83.07
1.62	57.86	63.78	2.12	75.71	83.46
1.63	58.21	64.17	2.13	76.07	83.85
1.64	58.57	64.56	2.14	76.43	84.25
1.65	58.93	64.96	2.15	76.79	84.64
1.66	59.29	65.35	2.16	77.14	85.04
1.67	59.64	65.75	2.17	77.50	85.43
1.68	60.00	66.14	2.18	77.86	85.82
1.69	60.36	66.53	2.19	78.21	86.22
\$1.70	\$60.71	\$66.93	\$2.20	\$78.57	\$86.61
1.71	61.07	67.32	2.21	78.93	87.00
1.72	61.43	67.71	2.22	79.29	87.40
1.73	61.79	68.11	2.23	79.64	87.79
1.74	62.14	68.50	2.24	80.00	88.18
1.75	62.50	68.89	2.25	80.36	88.58
1.76	62.86	69.29	2.26	80.71	88.97
1.77	63.21	69.68	2.27	81.07	89.37
1.78	63.57	70.08	2.28	81.43	89.76
1.79	63.93	70.47	2.29	81.79	90.15

PRICE PER:			PRICE PER:		
Bushel	Ton	Tonne	Bushel	Ton	Tonne
\$2.30	\$82.14	\$90.55	\$ 2.75	\$ 98.21	\$ 108.26
2.31	82.50	90.94	2.76	98.57	108.66
2.32	82.86	91.33	2.77	98.93	109.05
2.33	83.21	91.73	2.78	99.29	109.44
2.34	83.57	92.12	2.79	99.64	109.84
2.35	83.93	92.52			
2.36	84.29	92.91	\$2.80	\$100.00	\$110.23
2.37	84.64	93.30	2.81	100.36	110.62
2.38	85.00	93.70	2.82	100.71	111.02
2.39	85.36	94.09	2.83	101.07	111.41
			2.84	101.43	111.81
\$2.40	\$85.71	\$94.48	2.85	101.79	112.20
2.41	86.07	94.88	2.86	102.14	112.59
2.42	86.43	95.27	2.87	102.50	112.99
2.43	86.79	95.66	2.88	102.86	113.38
2.44	87.14	96.06	2.89	103.21	113.77
2.45	87.71	96.45			
2.46	87.86	96.85	\$2.90	\$103.57	\$114.17
2.47	88.21	97.24	2.91	103.93	114.56
2.48	88.57	97.63	2.92	104.29	114.96
2.49	88.93	98.03	2.93	104.64	115.35
			2.94	105.00	115.74
\$2.50	\$89.29	\$98.42	2.95	105.36	116.14
2.51	89.64	98.81	2.96	105.71	116.53
2.52	90.00	99.21	2.97	106.07	116.92
2.53	90.36	99.60	2.98	106.43	117.32
2.54	90.71	100.00	2.99	106.79	117.71
2.55	91.07	100.39			
2.56	91.43	100.78	\$3.00	\$107.14	\$118.10
2.57	91.79	101.18	3.01	107.50	118.50
2.58	92.14	101.57	3.02	107.86	118.89
2.59	92.50	101.96	3.03	108.21	119.29
			3.04	108.57	119.68
\$2.60	\$92.86	\$102.36	3.05	108.93	120.07
2.61	93.21	102.75	3.06	109.29	120.47
2.62	93.57	103.14	3.07	109.64	120.86
2.63	93.93	103.54	3.08	110.00	121.25
2.64	94.29	103.93	3.09	110.36	121.65
2.65	94.64	104.33			
2.66	95.00	104.72	\$3.10	\$110.71	\$122.04
2.67	95.36	105.11	3.11	111.07	122.44
2.68	95.71	105.51	3.12	111.43	122.83
2.69	96.07	105.90	3.13	111.79	123.22
			3.14	112.14	123.62
\$2.70	\$96.43	\$106.29	3.15	112.50	124.01
2.71	96.79	106.69	3.16	112.86	124.40
2.72	97.14	107.08	3.17	113.21	124.80
2.73	97.50	107.48	3.18	113.57	125.19
2.74	97.86	107.87	3.19	113.93	125.58

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